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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Development of a decision support system for tsunami evacuation in the South China Sea region" *by* Jingming Hou et al.

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Authors' response to Anonymous Referee #2

Firstly, we would like to thank this referee for accepting to review this paper and for the in-depth and positive evaluation and useful comments. We have carefully considered all the comments and made the suggested changes in our manuscript. Our responses to the comments are shown below. Our responses to the comments are shown below. The revised paper is in the supplement.

Referee #2 General comments:

Title of this manuscript sounds interesting but the detail seems to be lower than what

have stated in the title. The manuscript needs major improvement in their method, study area, explanation and English writing so that it can be reached to international standard. Please find my comments as shown below. Major comments - Only one study area in China cannot represent the evacuation for whole SCS region. If the authors would like to do such quick and simple method, at least they should have one or two more target areas to show performance of the system in both near-field and far-field tsunami. Verification of the model is needed to convince readers that even such simple method is applicable. - How fast is the processing time required for this decision support system? I suggest to add information of time in Fig. 1. I believe that each country in SCS region has different timing of tsunami warning preparation. Please add information about this and tell readers how this system can help at each timing for SCS countries. - The use of English should be very much improved by a native speaker.

General Response:

We have changed the name of this paper to "Development of a decision support system for tsunami evacuation: application to the Jiyang District of Sanya City in China". We have modified the framework of this paper, adding the tsunami travel time. And this paper has been improved by a native English speaker. It may take 2 minutes to get tsunami hazard information using the decision support system. The vulnerability analysis requires 2 to 4 minutes. It takes 5 minutes for the system to provide tsunami static analysis results. Tsunami dynamic evacuation analysis may take several hours, but this analysis can be used to study local tsunami evacuation problems before a tsunami occurs.

Specific comments:

Comment (a):

Title: The title should be more specific by mentioning the study area. L36-37: This reference Benard (2005) is too old to support the statement "Currently, many govern-

ments."

Response (a):

The title of this paper has changed into "Development of a decision support system for tsunami evacuation: application to the Jiyang District of Sanya City in China". The reference Benard (2005) has been replaced by "Scheer S, Gardi A, Guillande R, et al. Handbook of Tsunami evacuation planning[J]. Retrieved March, 2011, 3: 2013."

Comment (b):

L53: Objective and purpose of this paper should be written at the end of section 1.

Response (b):

We have added the purpose of this paper in Lines 38-44 of the revised paper.

Comment (c):

L55-67: More literature review is needed. There are more types of evacuation model than what have mentioned in this part. I don't think that the agent-based model is only for evacuation drill. It can be for disaster planning as well. What do you mean by "the decision makes do not know well"?

Response (c):

More literature review has been added in Line 46 of the revised paper. Both the least-cost-distance model and the agent-based model are adopted in the revised paper.

Comment (d):

L70-78: Should other items in Fig. 1 be explained? How much detail of fault mechanism considered in the database? Do they also have events outside of subduction zone in the database? Explain briefly about evacuation cost here.

Response (d):

The framework has changed in Line 56. The detail of fault mechanism is in Lines 114-123.

Comment (e):

L117-129: Evacuation time can also be a time from a natural warning (i.e. ground shaking) in case of no warning system. The authors should scientifically state why equation (1) is proper to be applied to this region. They should also more clear by saying that the tsunami travel time is estimated by dividing the distance from epicenter to target area by tsunami celerity, C (not to be confused with flow velocity). What do you mean by "numerical tsunami travel time model"? Fig. 4 should be improved by adding the location names (i.e. China, the Philippines, Hinan, Luzon, Manila Trench) and the estimated tsunami celerity during the deeper (4,000 m) and shallower (2,000 m) section in the figure

Response (e):

We have modified the method of tsunami travel time calculation. The tsunami travel time is calculated by the numerical model TTT in the revised paper, not estimated by the water depth.

Comment (f):

L133-142: "Influence area", what is the meaning of "influence"? Is it from tsunami amplitude, arrival time or any other parameters? The simple radius based on earthquake magnitude shown in Fig. 5 is too simple. As the authors had mentioned in section 4.2 that the evacuation time is calculated by the sea depth, the sea depth, coastal topography of each communities for both sides of the Philippines are quite different and cannot be just simply represent by the radius.

Response (f):

This method has been modified in the revised paper. The tsunami hazard information is obtained from two numerical model COMCOT and TTT. The numerical calculation is

conducted in advance, and the results are imported in to a database.

Comment (g):

L161: How do you relate “magnitude (do you mean earthquake magnitude?)” to “physical nature of tsunami”?

Response (g):

We have deleted this paragraph because the framework of the system was changed.

Comment (h):

L182-191: I am not sure if the 8.3 km was really happened. Where was it and what kind of topography? Please scientifically explain why equation (2) is suitable to apply to your study area or other areas in SCS region. Only tsunami height is a parameter for equation (2). Such large overestimation can be occurred in mountain areas where tsunami is limited by the topography. The authors should also explain why they used the distance of 8 km as shown in Fig. 8. What is their expected Y0 to get 8 km distance?

Response (h):

This paragraph has been deleted because the offshore distance is not used to analyze the vulnerability. We have modified the framework of the system.

Comment (i):

L221-237: There are many parameters related to the traffic during evacuation such as road width, traffic regulation during tsunami warning, distribution of evacuation shelters, ratio of evacuation using car, number of people in one car, day or nighttime that the authors did not mention. Explanations of the evacuation cost analysis is too simple and not enough to understand.

Response (i):

Some of these parameters are considered in the revised paper, such as road width, evacuation shelters, ratio of evacuation using car. The percentage of evacuation by car is from 0 to 100% in the dynamic evacuation analysis. The scenarios of day and nighttime are not considered in the system. Budiarjo (2006) estimate the population in the house by assuming 50% of the occupants are outside the house in day scenario. This needs more detail data about population and houses. Future research will focus on this. Explanations of the evacuation cost analysis is in lines 207-218.

Comment (j):

L247-262: The conclusion is rather simple. They should write, for example, major finding in their study or benefit (from their discussed results) to agent-based model or suggest how to develop your proposed system to other countries or regions.

Response (j):

The conclusion has been modified in Lines 285-311.

Please also note the supplement to this comment:
http://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2016-319/nhess-2016-319-AC2-supplement.pdf

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